

OPTIMIZED TRENCH POWER MOSFET WITH INTEGRATED SCHOTTKY DIODE

ABSTRACT OF THE DISCLOSURE

In accordance with the present invention, a monolithically integrated structure combines a field effect transistor and a Schottky structure in an active area of a semiconductor substrate. The field effect transistor includes a first trench extending into the substrate and substantially filled by conductive material forming a gate electrode of the field effect transistor. A pair of doped source regions are positioned adjacent to and on opposite sides of the trench and inside a doped body region. The Schottky structure includes a pair of adjacent trenches extending into the substrate. Each of the pair of adjacent trenches is substantially filled by a conductive material which is separated from trench side-walls by a thin layer of dielectric. The Schottky structure consumes 2.5% to 5.0% of the active area, and the field effect transistor consumes the remaining portion of the active area.

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